

# DETERMINING THE SPEED OF MULTICOMPONENT HYDROCARBON MIXTURE PHASE TRANSITIONS IN THE FREE VOLUME $\text{Al}_2\text{O}_3$ & $\text{MgO}$

*Bogdanov A.V.,<sup>1</sup> Grigoriev E.B.,<sup>1</sup> Sokotushenko V.N.\*<sup>2</sup>*

<sup>1</sup>*LLC Gazprom VNIIGAZ, Razvilka, Russia,* <sup>2</sup>*State University Dubna, Dubna, Russia*

*\*sokotushenko@mail.ru*

To study the phase transition processes in the intensive pressure reduction in gas-condensate systems [1–3] a series of experiments on the sharp decrease and increase pressure in the PVT cell by different values relative to the initial pressure is carried out, corresponding to the equilibrium gas state. Basic controlled in the study parameters – pressure in the recombinator and temperature. Experiments to determine the relaxation time of phase transitions were performed by static method. In this case, the phase transition occurred in a stationary gas in a closed volume.

In the framework of mathematical formulation of the problem, one resolving equation with respect to the phase velocities is obtained from the system of fluid motion equations. The calculation of the thermodynamic properties (TDS) of a multicomponent hydrocarbon mixture under volume change (adiabatic compression – expansion) is presented and sharp pressure fluctuations in the cell recombinator, as well as the relaxation time of phase transitions on the example of 4-component mixture:  $\text{CH}_4$  –  $\text{C}_3\text{H}_8$  –  $\text{C}_5\text{H}_{12}$  –  $\text{C}_7\text{H}_{16}$ .

Comparison of the obtained pressure distribution by the developed mathematical model on the boundary sections of the recombinator cell with the obtained from the experiment data on the measurements of pressure at the corresponding points of the recombinator cell gives an error of less than 5%, that is a satisfactory result of the mathematical model approbation.

- 
1. Grigoriev B.A., Gerasimov A.A., Grigoriev E.B. Fundamental equations of the state of hydrocarbons in the critical region. Interdisciplinary scientific and technical journal. Defense complex – scientific and technological progress of Russia. 2010. V. 3. P. 52-60.
  2. Buleyko V.M., Vovchuk G.A., Grigoriev E.B., Fedoseev A.P. Experimental study of thermodynamic properties of gas hydrates in porous media under temperature and pressure conditions corresponding to the liquid state of the hydrocarbon hydrateforming components. News of gas science: Topical issues of studies of formation systems of hydrocarbon deposits. — Moscow: Gazprom VNIIGAZ. 2013. V. 1 (12).
  3. Grigoriev B.A., Zaichenko V.M., Molchanov D.A., Sokotushenko V.N. Mathematical modeling of isothermal filtration of gas condensate mixture at differ-

ent flow regimes. Lead gas science: Actual problems of studies of hydrocarbon deposits. — Moscow: Gazprom VNIIGAZ, 2016. — V. 4 (28). — P. 37-40.